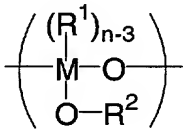
WHAT IS CLAIMED IS:

1. An electrolyte composition comprising a polymer compound including repetitive units of a structure of the following general formula (1), and a salt of a metal ion of Group 1 or 2 of the Periodic Table:



General formula (1)

wherein R^1 represents one of a substituted or unsubstituted alkyl group and a substituted or unsubstituted alkoxy group; R^2 represents a substituted or unsubstituted alkyl group; at least one of R^1 and O-R^2 includes a substituent including an alkoxycarbonyl group; M represents silicon, boron or a metal element; and n represents the valence of M.

2. The electrolyte composition according to claim 1, wherein M in general formula (1) represents silicon.

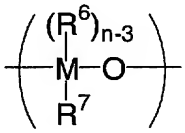
3. The electrolyte composition according to claim 1, wherein R^1 in general formula (1) represents a substituted or unsubstituted alkoxy group.

4. The electrolyte composition according to claim 1, wherein the polymer compound comprises a product prepared by reacting a compound of the following general formula (2), with a hydroxyl group-having carboxylic acid:

$$(R^1)M(OR^3)_{n-1}$$ General formula (2)

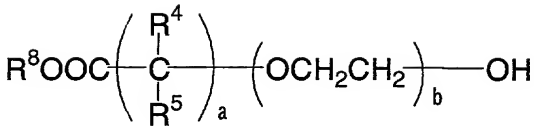
wherein R^1 represents one of a substituted or unsubstituted alkyl group and a substituted or unsubstituted alkoxy group; M represents silicon, boron or a metal element; n represents the valence of the element represented by M; and R^3 represents a substituted or unsubstituted alkyl group.

5. The electrolyte composition according to claim 1, wherein the polymer compound comprises a product prepared by reacting a polymer compound that includes repetitive units of a structure of the following general formula (4) with an alkoxycarbonyl group-having alcohol compound:

 General formula (4)

wherein R^6 represents one of a substituted or unsubstituted alkyl group and a substituted or unsubstituted alkoxy group; R^7 represents a substituted or unsubstituted alkoxy group; M represents silicon, boron or a metal element; and n represents the valence of M.

6. The electrolyte composition according to claim 5, wherein the alkoxycarbonyl group-having alcohol compound comprises an alkoxycarbonyl group-having alcohol compound represented by the following general formula (5):



General formula (5)

wherein R^8 represents a substituted or unsubstituted alkyl group; R^4 and R^5 each independently represent a hydrogen atom or an alkyl group; a represents an integer from 1 to 5; and b represents an integer from 0 to 30.

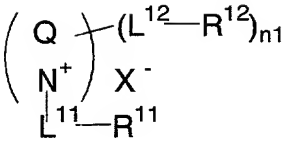
7. The electrolyte composition according to claim 6, wherein, in general formula (5), a is 1 and b is 0.

8. The electrolyte composition according to claim 6, wherein R^4 and R^5 in general formula (5) each represent a hydrogen atom.

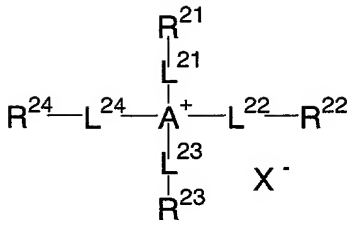
9. The electrolyte composition according to claim 1, wherein the electrolyte composition has been crosslinked by reacting with a compound having at least two nucleophilic groups in the molecule.

10. An electrolyte composition comprising a molten salt, a silicon polymer, and a salt of a metal ion of Group 1 or 2 of the Periodic Table.

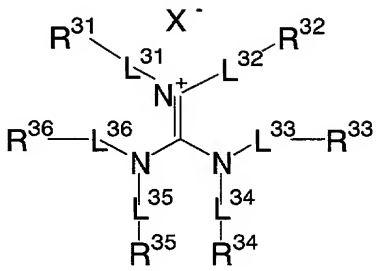
11. The electrolyte composition according to claim 10, wherein the molten salt comprises a compound represented by at least one of the following general formulae (6), (7) and (8):



General formula (6)



General formula (7)



General formula (8)

wherein, in general formula (6), Q represents an atomic group capable of forming a 5-membered or 6-membered aromatic cation with the nitrogen atom of the general formula; L^{11} and L^{12} each independently represent one of a substituted or unsubstituted alkylene group, a substituted or unsubstituted alkenylene group, a substituted or unsubstituted alkyleneoxy group or a divalent linking group formed of repetitions thereof, a substituted or unsubstituted alkenyleneoxy group or a divalent linking group formed of repetitions thereof, or a divalent linking group formed of a combination of a plurality of the groups; R^{11} represents a hydrogen atom or a substituent; R^{12} represents a hydrogen atom or a substituent; n1 represents an integer of 0 or from 1 to the maximum number of (L^{12}-R^{12}) groups substitutable on Q; X^- represents an anion; if n1 is 2 or more, the (L^{12}-R^{12}) groups may be the same as or different from one another; and two or more of the R^{11} and R^{12} may be bonded to each other to form a cyclic

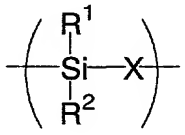
structure,

in general formula (7), L^{21}, L^{22}, L^{23} and L^{24} have the same meaning as L^{11} in general formula (6); R^{21}, R^{22}, R^{23} and R^{24} each independently represent a hydrogen atom or a substituent; two or more of R^{21}, R^{22}, R^{23} and R^{24} may be bonded to each other to form a cyclic structure; and A represents a nitrogen or phosphorus atom, and

in general formula (8), L^{31} to L^{36} have the same meaning as L^{11} in general formula (6); R^{31} to R^{36} each independently represent a hydrogen atom or a substituent; and two or more of R^{31} to R^{36} may be bonded to each other to form a cyclic structure.

12. The electrolyte composition according to claim 11, wherein the 5-membered or 6-membered aromatic cation that Q is capable of forming with the nitrogen atom in general formula (6) comprises one of an imidazolium cation and a pyridinium cation.

13. The electrolyte composition according to claim 10, wherein the silicon polymer comprises repetitive units of a structure of the following general formula (11):

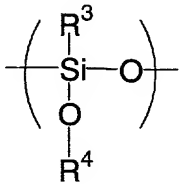


General formula (11)

wherein R^1 and R^2 each independently represent one of an alkyl group, an alkoxy group, an aryl group, and an aryloxy group; and X represents one of an oxygen atom, a nitrogen atom, an alkylene group, a phenylene group, a

silicon atom and a metal atom, or an atomic group combination thereof.

14. The electrolyte composition according to claim 13, wherein the silicon polymer including repetitive units of a structure of general formula (11) comprises repetitive units of a structure of the following general formula (12):



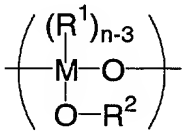
General formula (12)

wherein R^3 represents one of an alkyl group, an alkoxy group, an aryl group and an aryloxy group; and R^4 represents one of an alkyl group and an aryl group.

15. A method for producing an electrolyte composition, the method comprising the steps of:

preparing a polymer compound including repetitive units of a structure of the following general formula (1), which includes reacting a compound of the following general formula (2) with a hydroxyl group-having carboxylic acid; and

adding a salt of a metal ion of Group 1 or 2 of the Periodic Table to the polymer compound:



General formula (1)

wherein, in general formula (1), R^1 represents one of a substituted or unsubstituted alkyl group and a substituted or unsubstituted alkoxy group; R^2 represents a substituted or unsubstituted alkyl group; at least one of R^1 and O-R^2 includes a substituent including an alkoxycarbonyl group; M represents silicon, boron or a metal element; and n represents the valence of M, and

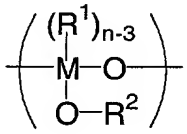
$$(R^1)M(OR^3)_{n-1} \qquad \text{General formula (2)}$$

in general formula (2), R^1 represents one of a substituted or unsubstituted alkyl group and a substituted or unsubstituted alkoxy group; M represents silicon, boron or a metal element; n represents the valence of the element represented by M; and R^3 represents a substituted or unsubstituted alkyl group.

16. A method for producing an electrolyte composition, the method comprising the steps of:

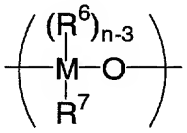
preparing a polymer compound including repetitive units of a structure of the following general formula (1), which includes reacting a polymer compound having repetitive units of a structure of the following general formula (4), with an alkoxycarbonyl group-having alcohol compound; and

adding a salt of a metal ion of Group 1 or 2 of the Periodic Table to the polymer compound:



General formula (1)

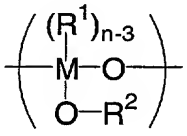
wherein, in general formula (1), R^1 represents one of a substituted or unsubstituted alkyl group and a substituted or unsubstituted alkoxy group; R^2 represents a substituted or unsubstituted alkyl group; at least one of R^1 and O-R^2 includes a substituent including an alkoxycarbonyl group; M represents silicon, boron or a metal element; and n represents the valence of M, and



General formula (4)

in general formula (4), R^6 represents one of a substituted or unsubstituted alkyl group and a substituted or unsubstituted alkoxy group; R^7 represents a substituted or unsubstituted alkoxy group; M represents silicon, boron or a metal element; and n represents the valence of M.

17. A non-aqueous electrolyte secondary cell comprising an electrolyte composition, a positive electrode and a negative electrode, the electrolyte composition coupling the electrodes to one another, and the electrolyte composition including a polymer compound including repetitive units of a structure of the following general formula (1), and a salt of a metal ion of Group 1 or 2 of the Periodic Table:



General formula (1)

wherein R^1 represents one of a substituted or unsubstituted alkyl group and a substituted or unsubstituted alkoxy group; R^2 represents a substituted or unsubstituted alkyl group; at least one of R^1 and $O\text{-}R^2$ includes a substituent including an alkoxycarbonyl group; M represents silicon, boron or a metal element; and n represents the valence of M.

18. A non-aqueous electrolyte secondary cell comprising an electrolyte composition, a positive electrode and a negative electrode, the electrolyte composition coupling the electrodes to one another, and the electrolyte composition including a molten salt, a silicon polymer, and a salt of a metal ion of Group 1 or 2 of the Periodic Table.